

Patent Claims

1. A process for producing surface-modified work pieces made from a metal and/or one or more alloys, comprising the steps of providing the workpiece which is to be modified and treating this workpiece with at least one modifying agent to obtain the surface-modified workpiece, the workpiece to be modified which is provided being at a temperature of from 40 to 700°C, in particular from 80 to 550°C, and the at least one modifying agent being at a temperature of at least - 200°C, in particular at least 0°C, and at most 100°C, in particular at most 80°C.
2. A process for producing surface-modified workpieces made from a metal and/or one or more alloys, comprising the steps of providing the workpiece which is to be modified and treating this workpiece with at least one modifying agent to obtain the surface-modified workpiece, the at least one modifying agent being at a temperature of from 80 to 550°C, in particular from 80 to 550°.
3. The process as claimed in claim 2, in which the workpiece to be modified that is provided is at a temperature of from 15 to 80°C.
4. The process as claimed in claim 2, in which the workpiece to be modified that is provided is at a temperature of from 40 to 660°C, in particular 80 to 550°C.
5. The process as claimed in one of the preceding claims, in which the workpiece to be modified that is provided is at a temperature of from 300 to 550°C.
6. The process as claimed in one of the preceding claims, in which the metal or an alloy contains aluminum, magnesium and/or copper.

7. The process as claimed in one of the preceding claims, in which the modifying agent includes a salt, in particular a metal salt in particular of an element
5 from one of the transition groups, in particular transition groups IV to VI of the PSE (periodic system of the elements).

8. The process as claimed in one of the preceding
10 claims, in which the modifying agent includes a metal salt of a element from main group I, II, III or IV of the PSE.

9. The process as claimed in one of the preceding
15 claims, in which the modifying agent includes a compound of an element from main group V, VI, VII or VIII of the PSE.

10. The process as claimed in one of the preceding
20 claims, in which the modifying agent includes a CAB flux, in particular potassium aluminum hexafluoride.

11. The process as claimed in one of the preceding claims, in which the modifying agent includes an
25 ammonium salt, in particular ammonium fluoride, potassium fluoride, sodium or potassium silicate, sodium or potassium borate, sodium or potassium aluminate and/or at least one crosslinkable compound, such as for example an organometal, in particular
30 organozirconium or organotitanium compound and/or at least one organosilicon compound or the like.

12. The process as claimed in one of the preceding claims, in which the metal salt is in an aqueous phase,
35 the pH of which is in particular between 1 and 14, in particular between 3 and 10, in particular between 4 and 8.

13. The process as claimed in one of the preceding

claims, in which the CAB flux, the ammonium salt or the potassium fluoride is in a phase with an alkaline pH.

14. The process as claimed in one of the preceding
5 claims, in which the modifying agent includes water, in particular deionized and distilled water, or an aqueous solution containing ammonia, amines, gases or organic acids or their salts or mixtures thereof

10 15. The process as claimed in one of the preceding claims, in which the treatment of the workpiece is carried out by the at least one modifying agent, in the form of an aerosol and/or vapor, being brought into contact with, in particular sprayed onto, the
15 workpiece.

16. The process as claimed in one of the preceding claims, in which the treatment of the workpiece is carried out by the workpiece being immersed in the at
20 least one modifying agent, which is in the form of an in particular aqueous solution, or being flooded therewith.

17. The process as claimed in one of the preceding
25 claims, in which a salt, in particular a metal salt, a CAB flux, ammonium fluoride, potassium fluoride, sodium or potassium silicate, sodium or potassium borate and/or sodium or potassium aluminate and/or at least one crosslinkable compound, such as for example an
30 organometal, in particular organozirconium or organotitanium compound and/or at least one organosilicon compound or the like is/are used in a matrix to treat the workpiece.

35 18. The process as claimed in claim 17, in which the matrix is composed of organic or inorganic solvents or mixtures thereof.

19. The process as claimed in one of the preceding

claims, in which a salt, in particular a metal salt, a CAB flux, ammonium fluoride, potassium fluoride, sodium or potassium silicate, sodium or potassium borate and/or sodium or potassium aluminate and/or organometal, in particular organozirconium or organotitanium, or organosilicon compounds is/are used to treat the workpiece in a concentration of from 10 ppm to 100000 ppm, in particular from 50 ppm to 10000 ppm.

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20. The process as claimed in one of the preceding claims, in which the workpiece which is to be modified is a heat exchanger, in particular a CAB brazed heat exchanger.

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21. The process as claimed in one of the preceding claims, in which the at least one modifying agent includes a biocidal agent and/or a corrosion inhibitor or produces a biocidal agent and/or a corrosion inhibitor on the surface of the workpiece.

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22. A surface-modified workpiece, produced by one of the processes as claimed in one of the preceding claims.

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23. The workpiece as claimed in claim 22, which in at least one in particular subsequent step is provided with an organic or inorganic coating system.

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24. The workpiece as claimed in claim 23, in which a coating system includes a biocidal agent and/or has hydrophilic or hydrophobic properties.

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25. A process for in particular cohesively joining at least two workpieces in particular as claimed in claim 23 or 24, comprising the steps of a) providing the workpieces, b) in particular cohesively joining, in particular brazing, soldering or welding, the workpieces to one another and c) surface-modifying at

least one of the workpieces, in which in particular steps b) and c) are carried out together and step c) is carried out as described in one of claims 1 to 20.

5 26. An apparatus for cohesively joining at least two workpieces, in particular for carrying out the process as claimed in claim 25, having a temperature-control chamber and a device arranged in or on the temperature-control chamber for applying a surface-modifying agent
10 to at least one workpiece.

27. The apparatus as claimed in claim 26, in which the device for applying a surface-modifying agent to at least one workpiece is designed as at least one in
15 particular temperature-controllable spray nozzle.